THE INDEPENDENT GUIDE TO IBM PERSONAL COMPUTERS

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Volume 4 Number 24
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November 26, 1985

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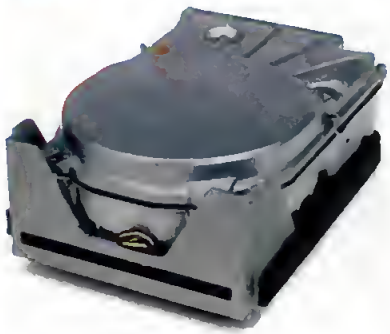

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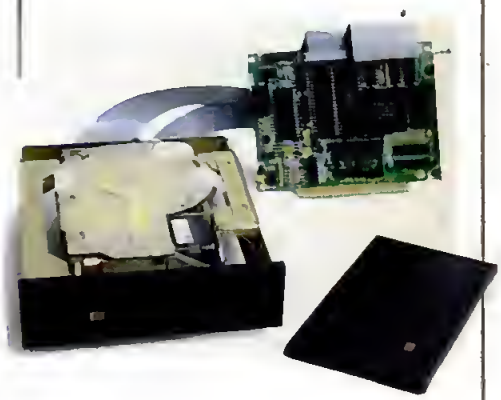

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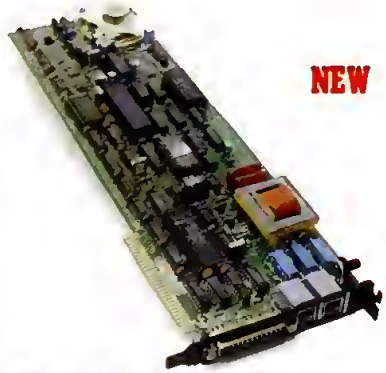

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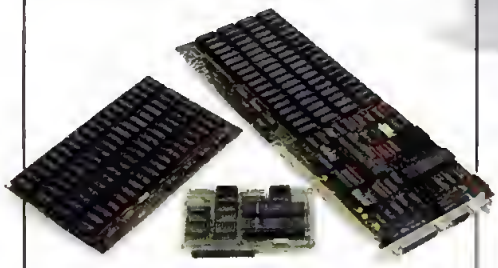

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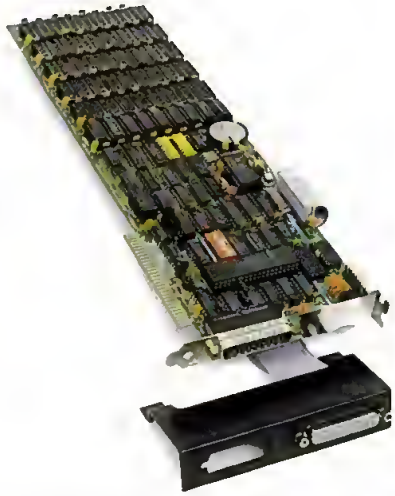

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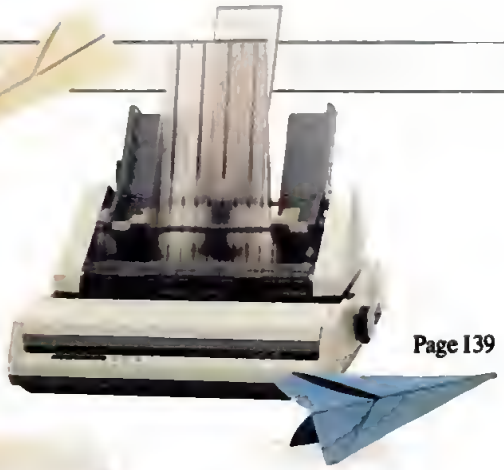

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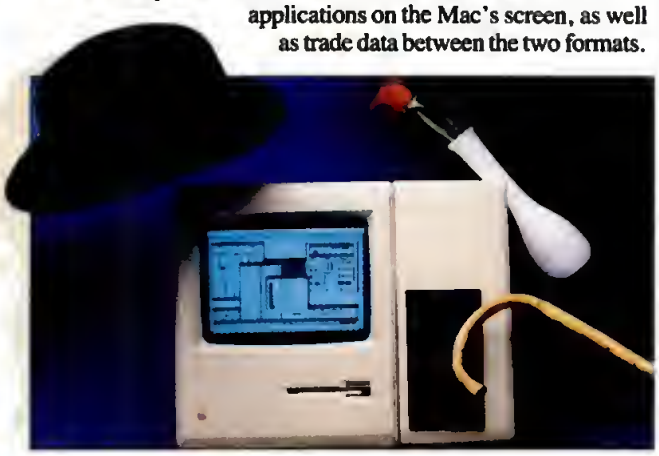

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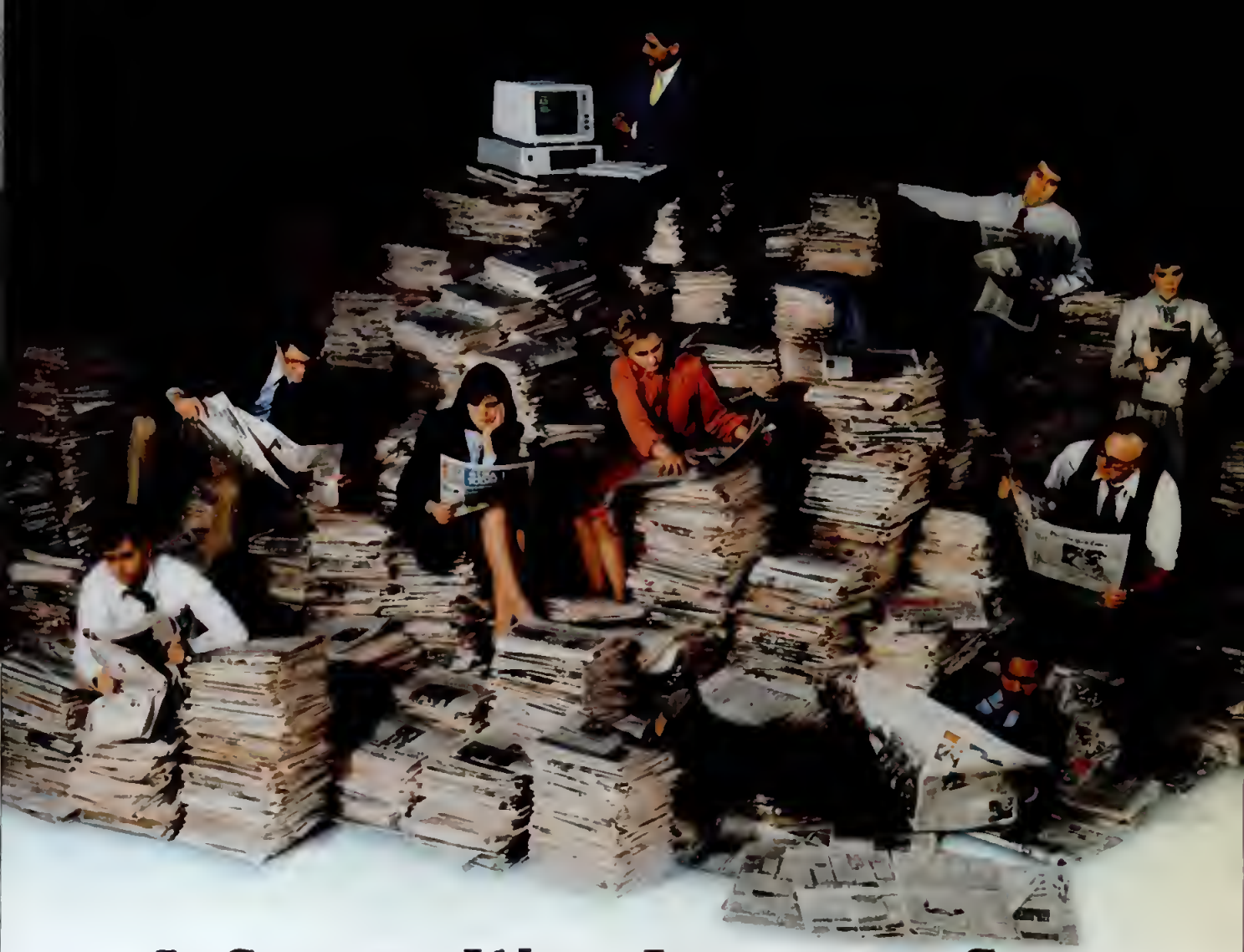

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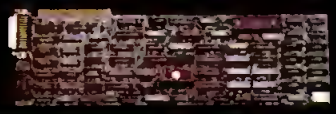

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Runs Color Software on a Monochroma Monitor Full Screen	✓	✓	✓	✓		
—in 16 shades of green on the IBM Monochrome monitor	✓	✓	✓	✓		
—Runs Flight Simulator, PC Paintbrush, IBM BASICA commands and more	✓	✓	✓	✓		✓
—No patches or modifications needed	✓		✓	✓		✓
—Displayed in the IBM standard 9x14 character set	✓	✓				✓
Extended Text Modes	✓		✓			✓
—132 columns by 25 rows in monochrome	✓		✓			✓
—132 columns by 44 rows in monochrome	✓		✓			✓
—132 columns by 25 rows in color	✓		✓			
Runs Lotus 1-2-3™ and Symphony™ in high resolution monochrome graphics	✓		✓		✓	✓
—in 132 columns by 25 rows	✓		1-2-3 only			✓
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Runs Lotus 1-2-3™ and Symphony™ in High Resolution color	✓		✓			
—16 colors 320x200	✓		✓			
— 4 colors, 640x200	✓		✓			
Software switchable for all display modes and monitors	✓		✓			
Software switchable display memory, 16K, 32K and 64K	✓					
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Printer Port (standard)	✓		✓	✓	✓	✓
Light Pen Connector (standerd)	✓	✓	✓		✓	
Works in eny PC-AT slot	✓			✓	✓	
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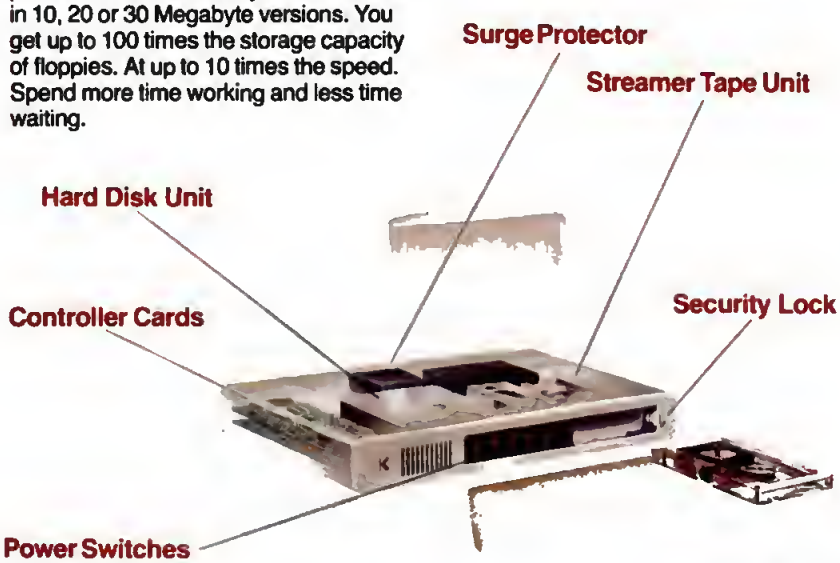

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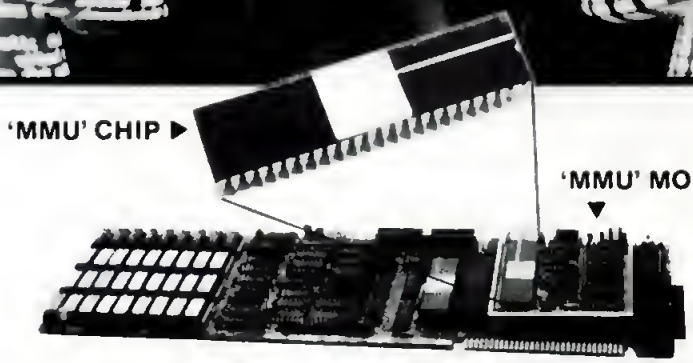

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PC Magazine—*May 14, 1985*

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What's Inside

In an industry where everything calls itself a "business productivity tool," at least 15 stand out. Also in this issue: sheet-feeders, low-cost LANs, and more PEEKs and POKEs.

The cover story for this issue of *PC Magazine* got the green light at the Chicago National Computer Conference this past July. Editor Bill Machrone, executive editors Paul Somerson and [illegible]g editor [illegible]n Mach- [illegible]long day [illegible]nding to [illegible]. NCC's [illegible]urgently [illegible]re that 80 [illegible]cipating. [illegible]l, Apple, Eagle, and others had decided to sit the show out. In Machrone's room, there were only three pressing considerations: how to make *PC Magazine*'s interactive subject index work better, what to order from room service, and whether or not to go with a productivity theme for issue 24

The hardest decision was room service. Once O'Cone opted for lox and toast, we were over the hump. The productivity theme was appealing from the start. We decided to depart from our usual round of product testing and write about a selection of real-life productivity tools about which we could say, "If you don't know about this product or one like it, you're missing the boat."

Owen, for example, couldn't imagine working life without MCI Mail or an equivalent. Somerson, whose convictions are steadfast, demanded to write about DOS, BASIC, and *The Norton Utilities*. Of course these programs are familiar to most readers, but he argued that users are either too easily intimidated by the advanced capabilities of these programs or they simply zero in on the most obvious ones (like the UnErase utility in *Norton*) to the exclusion of others just as worthy.

We listened to specific proposals from other staff members and contributing editors and then whittled the list down. In the end, we decided on 15 categories after purging 11 others. Decision support software may have its devotees, but we don't know anyone who can't live without it. The hardware, software, and services selected for this cover story represent solutions that PC users, once they've discovered them, can't live without. They make work easier, more convenient, or simply faster. To find out more (and see if you agree) turn to page 110.

While our cover story is a departure, we certainly haven't abandoned hands-on product evaluation in this issue. The PC Magazine Labs have been busy tearing into sheet-feeders, those increasingly sensible alternatives to the fanfold, track-fed standard. As David Stone notes on page 139, "Traditionally, sheet feeders have been limited to large word processing operations—and with good reason. Until recently, sheet feeders were available only for a select group of expensive, fully formed character printers. These printers typically cost $2,000 to $5,000. The sheet feeder itself often costs nearly as much." Not anymore.

Some readers have complained that we don't write enough about local area networks. True enough. It's not that we're not interested, but that even as DOS 4.0 becomes the new standard, the networking industry has been struggling to catch up with DOS 3.1. *Mirabile dictu*, it's been making progress. In fact, we're already well along on a special issue (to appear in spring '86) on LANs. In the meantime, you can update yourself on "zero-slot," RS-232-LAN options by reading contributing editor Frank J. Derfler, Jr.'s benchmarked reviews on page 169.

If you got hooked in the preceding issue, don't miss "PEEKing at Your PC's Memory, Part 2" on page 187. While the first installment dealt primarily with low-memory location manipulations, part 2 concentrates on flashier tricks centered on BASIC's abilities, graphics, the monochrome display, and ROM. Elsewhere in this issue, a review of a Macintosh-PC interface (page 179), loads of powerful programming tips and hints, and lots more. Take a look around; we think you'll like what you see. ■

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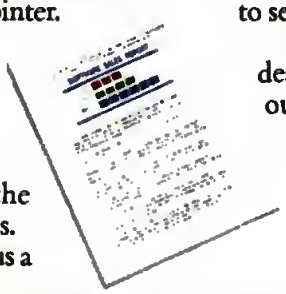

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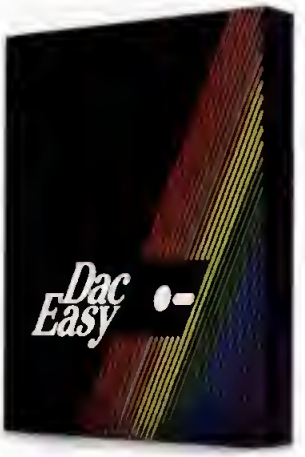

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NEW STUFF!

IF YOU PROGRAM IN 'C' DON'T TURN THE PAGE!

PADLOCK

RECOMMENDED!

Protect Any Program Using Anyone's Diskettes

You are a program developer seeking a low-cost method to protect against piracy? You are with a prominent company fearful of embarrassing lawsuits should employees copy programs illegally?

We have a devilishly clever solution for the two of you we call PadLock™ It gives you the keys to padlock any program you want—yours or someone else s—without buying a stockpile of expensive fingerprinted disks

PadLock is software One of its programs formats any manufacturer's disk, embedding your secret code in sectors the operating system will ignore Another program installs this code in any program files you name, whether YourProg or WordStar™, or any COM or EXE files From then on there s no picking the lock without the combination the coded software together with a coded disk

It's not despised copy prevention Protected programs can be copied anywhere to hard disks, to backup diskettes It s a lock and key scheme A protected program will just lock up at load time without a keyed diskette (such as its own) in one of the drives The key disk may then be removed to free the drive.

Padlock is economical You buy software that fingerprints 100 disks and their programs for $2 50 each, not costly fingerprinted disks you may never use at maybe $6 00 each

Tell you what PadLock keeps track of how many disks it has protected Try it out Format up to 5 test disks II PadLock doesn't suit you, return it within 30 days for full refund

Incidentally don't look elsewhere. PadLock is available only from PC Brand

Code	Our Price
M0100 100 formats	$250

BRIEF

OUTSTANDING!

Is Anything But. A Whopper of an Editor

Dvorak in *Infoworld* said it for us "the word is getting around that Brief, The Programmer's Editor is simply the best text editor you can buy" With a name that belies its thoroughness, Brief™ has every feature you've ever contemplated for your editor-in-chief Here goes

Text, from keyboard or files, is housed in multiple buffers, and scrolled through one or more windows you open, close, resize. A text buffer may be called to different windows to view two areas at once A change in one changes both Text blocks may be marked for printing, writing to files, movement to scrap buffers for cut and paste into other buffers, or deletion, with as many "undo" levels as you want

To find and fix Brief has text search abilities rivaling "grep," with wild cards for matching, indifference to intervening characters, acceptance of character ranges even multiple choice of patterns and their replacements

If you use Lattice, C86™, or Wizard, and have 320k you can compile your C program without ever leaving Brief In fact, Brief will then find the lines with errors, and march you through the text for repairs

On to macros! Parts of Brief were written with its own Lisp-like macro language It has structure, 32-character variable names, conditional execution, loops, and you can actually read it! Nothing like the hieroglyphs we've seen elsewhere. A compiler comes with your copy, and prewritten macros in source to give you the flavor Among the notables one automatically indents C text, another turns Brief into a word processer with margin setting and wraparound

There's a bulletin board with public domain macros contributed by a mushrooming cult of macromaniacs, and we ve even hearing of megamoney prices for magnificance.

Then there's but, really, we're out of space. Who named this product, anyway?

Product Code U0590(	Our Price
List Price $195	$CALL
Needs 192k	

FIRSTIME

Assistant Programmer for Hire. Real Cheap.

Not interested in interpreters? Then explore the other fast lane to coding language-specific editors Among them, FirsTime™ is the strongest C editor we have seen, with many more commands and built-in utilities

FirsTime asks what program structure you want and sets it up for you It could be "main", or "function", or "if-else" or "while" or any component of C Ask for it and FirsTime fills in its skeleton, tending to semi-colons and curly braces

It puts placeholders into these structures to prompt you to enter workable code—the initializers, conditionals and counters which govern an "if", for example It checks that variables you enter have been declared, and highlights errors until fixed Material can be pulled into ten buffers for movement elsewhere. Your last delete is held in one of them for "undoing ' There's search and replace, writing of any marked block to a satellite file or the printer

FirsTime can even transform one type of structure into another, such as "for" into "while" or "while" into "do"

Movement through the screen highlights the successive logical blocks of your program so that its structure is always apparent And FirsTime can hide different levels of code detail to show you only the outer framework of your program

FirsTime saves keystrokes to add speed, indeed, but more important, it lets you think at a higher level and makes a big contribution toward error-free code

Product Code E0460	Our Price
List Price $295	$229

LMK

A Unix-like "Make" Makes Light of System Building in Any Language

If you have ever built a complex system, you know the time loss and tedium of recompiling, rebuilding libraries and relinking modules because a snippet or two of code has changed Batch files are no answer You need batches of them to avoid redoing everything indiscriminately

Instead, imagine making a change deep in a system, and simply telling Lattice's LMK™ to take over No further thinking or keystrokes LMK will rebuild your final product, however involved and complex by doing just what is needed and no more

How? You write a command file which expresses, bottom to top, all the elements comprising your system and all its dependencies what gets compiled to make what object file using what options, what is built into libraries, what is linked into the final EXE file Through the life of your system LMK keeps track of the last time every action was performed Run LMK and, tracking each branch, it looks only for elements which changed later than a dependent element further along the branch using date and time information in the file directory Any source file newer than its object file, for example. Only those elements and their dependents are re-made. All other instructions are bypassed

LMK does not care what programming language you use, it's not just for C For that matter LMK can apply to more than programming It can be used for any set of tasks which can be accomplished through commands issued to the operating system

Wherever your imagination leads you, LMK will find the shortest path to get the job done Minimum time, minimum effort software.

Product Code L2100	Our Price
List Price $195	$159

CODE SIFTER

Find the Fast Track for Your Program

You know it runs, but how fast? If it can't win, better not enter your program in today's horse race Don't let it out of the stable until you ve put it through its paces with our value- priced stopwatch

Code Sifter finds the sluggish spots in your program On its own, it will divide a COM or EXE file of any size into thirty-two equal partitions Or specify the partition boundaries with addresses, or with symbols, if your linker has produced a symbol map Then tell Sifter to run your program It samples your object file at precisely timed intervals and counts how many times it finds the instruction pointer in each partition. Job done, it reports the number and percentage of hits in each

You are in for some surprises when you discover how unbalanced the activity is likely to be, and that's why Code Sifter is so valuable. It profiles just where you can best spend time optimizing your code, or even converting to assembler subroutines.

Code Sifter has a number of monitoring options You can tell it to include any combination of your program, DOS, and BIOS in its analysis You can specify the sampling rate You can tell Code Sifter the number of times to run a program, and between each run discard the less active ranges, and re-partition the hot spots, so that you zoom in ever-tighter on small areas of code. Right down to the last byte! Try it on the sample program that comes with your disk

Code Sifter It will give you the racer's edge

Product Code N3100	Our Price
List Price $119	$ 99

C-SPRITE

Lattice's Own Symbolic Debugger for Lattice® C

This versatile companion to your compiler gives you the best of both worlds for an out of this world price. Hand it a COM or EXE file produced by the Lattice C™ compiler (using the -d option) and C-Sprite will speak your language your function names, your variable names, your data types, and the line numbers from your source code. At the same time you can get a close-up view of machine addresses and machine-coded instructions, if you want to scrutinize just what machinations the compiler (or an assembler) contrived

You already know how to converse with C-Sprite™ if you are familiar with Microsoft's Debug Lattice began with that well-known command language, and added to it considerably You can work with data in hex, as you might expect, but you can also differentiate between C's data types to cause the debugger to treat addresses as strings, long integers, even pointers, etc , both in display and entry

C-Sprite can set breakpoints using symbols or addresses You can submit clusters of commands to be executed at the breakpoints or set commands that execute until a condition is met

C-Sprite even has macros—use your source code variable names in a macro to dump the contents of entire C structures, for example And you can debug through one of the COM ports with a second terminal so as not to disturb your program's display screen What's more if you link with Plink86™, C-Sprite can even tackle overlays

Program doctors will find plenty of implements to rummage through in this kitbag

Product Code L2300	Our Price
List Price $175	$145

CURSES

A Screen Management Interface to Swear By

Curses manages the screen of the IBM PC in the same fashion as the curses utility of Unix and similar operating systems Use it to adapt programs which call Unix s curses functions for screen management and need the equivalent library when moved to the PC for re-compilation Or use it when creating software on the PC to assure that it is Unix compatible

Curses is a library of eighty-four functions and macros which can keep any number of screen images in memory A screen may be full or partial size, and any can be summoned to the physical screen at your programs s command

Within a screen, Curses employs a vast function set to get characters wrap lines, scroll, blank lines highlight— virtually any conceivable tool needed to update the screen The product supports color, and all four memory models Its input functions give you control over whether to echo each character to a memory screen In keeping with the terminal orientation of Unix curses, the physical screen is repainted (at high speed) only when your program calls a refresh function

Writing screen management code leads to unspeakable snarls and expressions Swear off! Let Curses clean up your language.

Code	List Price	Our Price
L0850	$125	$100
L0860 with Source	$250	$200

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CRAFTSMAN™ QUALITY SOFTWARE FOR 'C' & OTHER PROGRAMMERS

C-TREE

NEW FEATURES!

B-Tree File Manager, Source Code, No Royalties!

A b-tree can be infested with bugs, so before buying one, ask its age. In a stand of saplings, this one is a real cequoia. C-tree™ has been around since 1979. (It became Digital Research's Access Manager™.) That means seasoned, sturdy code which hasn't cracked under prolonged and widespread use.

C-tree comes in C source code, revealing all you've ever wanted to know about how b-trees are written. Provided you bind it into your binary application, you can re-distribute c-tree without royalties.

And if all this is disappointing, now the good part. C-tree's design splits nodes to allow any number of users to access an index file simultaneously even when updates are in progress so that multi-user configurations and adaptation to networks are possible.

The latest version has new features: support of variable record length data files, multiple key indexes in a single physical file, MS-DOS and Unix record locking examples.

Thanks to source code which does not deviate from K&R, C-tree can travel. Binary has always meant finding a substitute file manager for yet another compiler, operating system or computer, then changing all the function calls program-wide, then starting the whole testing process anew. That's over. Tests in many environments prove that C-tree gives your application a ticket to anywhere.

C-tree permits any number of keys for a data file, supports duplicate keys, alpha-numeric or numeric, etc., etc. It's a big product with everything you'd expect. Beyond that it is intelligently designed as both a high level set of ISAM routines to minimize your coding by handling all details of adding a record on its own, for example, and as low level operations which you can access directly. Either way C-tree maintains optimal index structures which will find a record amongst a million ten byte keys in no more than five disk seeks.

Product Code F0660(Our Price
List Price $395 **$329**

TEXT TOOLBOX

Tackles Text Tangles

Unix™ boasts a number of muscular utilities that are migrating to the PC world. Lattice has assembled a cluster of the most useful text management tools into a single package.

"Grep" looks for text patterns in any number of files. Want all occurrences of a global variable throughout a program system? Want to search all programs in a directory down paths to other directories, or all files on a disk? Need to find all the function calls in an entire program system? Grep can do it with a powerful expression syntax that goes far beyond your text editor's search command.

"Ed" is similar to the well-known Unix editor. It offers search and replace with "grep's" syntax, block move, read and write, optional line numbering, append, insert, delete, and this unusual facility: you can instruct "ed" to apply a file of commands to any number of target files, even complicated changes and text additions, such as those created by "diff".

"Diff" compares text files line for line. Its output is a precise list of instructions telling what to do to make two files the same, a list which can be handed to "ed" to do.

Code	List Price	Our Price
L2200	$120	**$100**
L2205 with Source	$240	**$200**

CVUE

Make Your Own Editor

CVUE is a low-priced screen-oriented text editor which does most of the things that a good editor should do and boasts full DOS 2.0 directory path name support in reading and writing files.

It was written by the Lattice programmers who felt forgotten by the folks who write WP software. They needed easy entry of non-display characters such as control codes and escape sequences, not footnotes, indenting and undenting, not italics, pattern searching, not spell checking. So CVUE™ was born.

CVUE only supports in-memory text files, but with memory at today's prices, creating and maintaining files of over 500 K is practical. As compensation, CVUE is very compact and fast. It actually runs in computers with only 64 K of memory and uses no tediously slow overlays.

The power of CVUE is its ease of customization. And when you take advantage of the Source Code option, the resultant editor can be made truly your own.

Code	List Price	Our Price
L2240	$ 75	**$ 69**
L2245 with Source	$200	**$220**

USED COMPILERS WELCOME

Trade In for the Latest Model Lattice C

Has your compiler run out of gas? Has your model been discontinued? Is it falling behind for lack of new parts?

Even if yours is in good shape, you have surely noticed there are more options and accessories produced to run with the Lattice C compiler than any other. Don't do without these additives any longer. It's time for new license plates. Trade in your original disks and manual of any of the compilers below and we'll send you Lattice's most up-to-date model.

From then on you will be adopted by Lattice for full, direct support by their technical specialists.

	Price
Microsoft MS-DOS/PC-DOS C	**$150**
Computer Innovations C86, Mark Williams C, Digital Research C, Whitesmith's C	**$200**

PRE-C

Thorough "Lint"-like Analysis Now on the PC

Unix users long for a "lint" to give programs a thorough cleaning before they disappear into a compiler.

Pre-C™ looms larger than "lint." It finds problems your compiler won't. Problems that a debugger will have trouble figuring out. Even problems which will cause trouble with other compilers.

Pre-C finds all the syntactical tripwires that will blow out a compiler: sure, but it goes after subtler problems: code which will never be accessed, casts with suspect conversions, variables declared as external but never used, functions never called, obsolete usage (even C has changed), machine-dependent expressions with will inhibit portability.

Compilers work with one module at a time. They know nothing of other modules which only meet up at link time. Pre-C can look at *all segments of your program at once* and report to you any inconsistencies of inter-module references: conflicting data type declarations, parameter lists, function calls which disagree with the functions themselves in number or data type, declarations of external functions which differ from their definition.

Pre-C uses the Unix System III compiler standard to safeguard maxium portability anywhere in the C world. There are then plentiful command line options to advise Pre-C what to flag and what to forgive: useful during early coding when some functions are empty or incomplete. The output of each analysis can be filed for use with subsequent Pre-C runs, so work is not performed redundantly.

Pre-C lets you develop standing profiles of binary libraries. In any C program you subsequently write, Pre-C can use these profiles to make sure your calls to those libraries' functions are perfect.

This is a big product which will work miracles in speeding large system development. 128K minimum, 192K recommended.

Product Code P0590 Our Price
List Price $395 **$329**

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dBC

Switch from dBASE Language to C for Power, Speed

There are a lot of dBASE™ file users out there. Most of them just keep data bases and use dBASE's limited reporting facilities. They're not programmers, so they don't use the dBASE programming language. But they'd like more for their efforts, and that's a business opportunity.

dBC™ links C to dBASE. It creates and maintains files and their indexes which exactly replicate dBASE file design. So dBASE can read and update them. And the reverse: dBC can use any files created by dBASE. Now C and dBASE can operate on the same data bases interchangeably.

That opens up the widespread culture of dBASE installations to exploitation by C programmers. Now you can replace the resident dBASE language with the speed of C. And you no longer have to write every line of code as in the dBASE language, because now you've unlocked C's vast storehouse of off-the-shelf libraries and utilities.

dBC's functions parallel all dBASE's file handling commands, many of them decomposed to give you closer-in control. The manual discusses each in detail and demonstration source files on your disk show how every function is used. Use dBC for custom work for clients, or design generalized programs for manipulation and reporting of dBASE data bases.

Or use dBC on its own. It's a complete ISAM file manager for use with the Lattice C compiler whether or not dBASE will ever be used in tandem: has versions for all four memory models, and can have sixteen index and data files open at once.

Code & Version	List Price	Our Price
L00II Dbase II Compatible	$ 250	**$225**
LCCII with Source Code	$ 500	**$450**
L0III Dbase III Compatible	$ 250	**$225**
LCIII with Source Code	$ 500	**$450**

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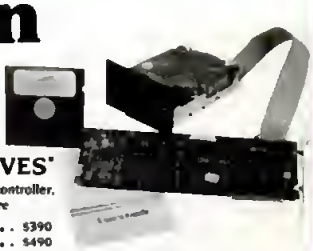

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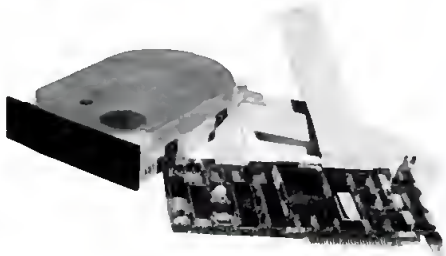

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NETWORK NEWS

Vol. 1, No. 4 *A GUIDE TO THE PROMISED LAN®* *Nov. 12, 1985*

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PROLAN Passive Hub 4 $100
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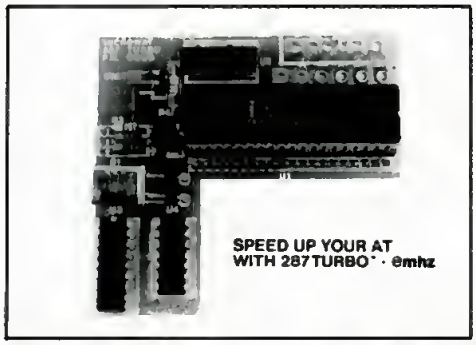

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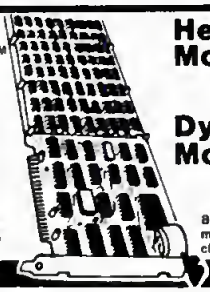

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CIRCLE 479 ON READER SERVICE CARD

PC News

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Lotus Makes New Waves

The spreadsheet that will still be king.

BY JARED TAYLOR

CAMBRIDGE, Mass.—Lotus' first major upgrade of *1-2-3* has arrived. Despite a challenge from a new generation of software, the king of the spreadsheets is not about to lose its crown.

Version 2.0, released in late September, has plenty of new tricks and razzle-dazzle, but not one feature has been taken away from Version 1A; it is a nearly perfect example of upward compatibility. In fact, when you load 2.0, the only clue that it's not 1A is a clock/calendar in the lower-left corner; however, you can turn it off.

You can use Version 2.0 just as you did 1A, but when you're ready to grow, so is 2.0. For example, spreadsheets can be made far bigger than before: 8,192 rows instead of 2,048. However, this requires more than 640K bytes of RAM, so you'll need extra memory (up to 4 megabytes) that meets the Lotus/Intel specification. Version 2.0 also drives the 8087 math coprocessor, so some calculations are much faster than with 1A.

Many basic spreadsheet operations are faster and smoother in Version 2.0. When loading or saving files, you can specify path names and subdirectories at the command line rather than having to change the default directory. A new /Range Value command allows a whole range's formulas to be turned into values—a big improvement over the old cell-by-cell technique.

Another time saver is the /Range Name Table command

(continued on next page)

1-2-3's New Features

	1-2-3, Version 2.0	*1-2-3*, Version 1A
Price	$495 ($150 upgrade from 1A)	$495
Release date	September 1985	January 1982 (Version 1.0)
Worksheet size	8,192 rows by 256 columns	2,048 rows by 256 columns
Minimum configuration	256K RAM, DOS 2.0 or later	192K RAM, DOS 1.1 or later
Maximum usable memory	4 Mbyte plus 640K RAM with expanded memory board	640K RAM
Backup system disk	No (1 extra supplied)	No (1 extra supplied)
Start from hard disk	Yes	No
Use 8087/80287 math chip	Yes	No
Date and time	Yes	Date only
Financial functions	11	5
Graph types	6 (adds exploded pie)	5
Use IBM EGA board	Yes	No
Read *Symphony* files	Yes	No
Site licensing	No	No
Direct access to DOS and subdirectories	Yes	No
Password protection	Yes	No
Circular reference for finding cell address	Yes	No
Hidden cells and columns	Yes	No
Page breaks	Yes	No

Other features:
- Label math: labels can be compared and ranked.
- 40 additional macro commands (see chart, page 33).
- 20 new logical and string-handling functions.
- Database can handle 8,191 records with 256 fields per record.
- Data query find that permits users to edit records during a query find.
- Single and multiple linear regression analysis.

IBM Offers New, Larger PC AT

BY CHRIS JOHNSTON AND PAUL SOMERSON

BOCA RATON, Fla.—IBM has just made a good thing better. The company's standard-setting PC AT is now available with IBM-manufactured 30-megabyte hard disks that can store 50 percent more than the original AT, at roughly the same aggressive price. The new 30-megabyte AT costs $5,995—a scant $200 more than the 20-megabyte version. Given the significant increase in storage and the low additional cost, most users will presumably select the larger machine.

Apart from its higher-capacity drives and a slightly modified BIOS, the new upgraded AT is exactly the same as the earlier models, inside and out. However, users of the new system who are willing to forego a second floppy drive can now salt away a whopping 60 megabytes of data.

Stung by criticism over its original problem-plagued 20-megabyte CMI hard disks, IBM is manufacturing the new higher-capacity drives itself in its Rochester, Minn., plant. The four-platter, nonplated, 30-megabyte drives operate at the same fast 40-millisecond access time as the smaller CMI drives. However, in contrast to the CMI drives, the new IBM Rochester disk heads park automatically when the computer is turned off.

IBM has no trade-in policy for current 20-megabyte AT users who want to upgrade their old-generation ATs. While the company is offering a "Disk Drive Upgrade Kit" for $1,995, the kit consists simply of a hard disk without the new BIOS. IBM is also offering the same drive for its AT/370. ■

Paradox Truly Combines Power with Ease of Use

BY FRANK J. DERFLER, JR.

A database product that truly combines power and speed with ease of use has eluded the software industry. Many products have claimed to offer this magic mix, but few have actually come through. Ansa Software's new *Paradox*, a heavy-duty, fast, relational database with a smooth user interface, may well be the product that will overturn *dBASE III*'s boat.

This first-look review shows that *Paradox* has the features to challenge the high-end market leader, and it also has something else: the backing of venture capitalist Ben Rosen, whose previous successful bets include Lotus Development and COMPAQ.

Paradox is limited mainly by the amount of disk storage space you have for it to run in. Every file can hold 65,000 records with 255 characters in each of 255 fields. These performance figures mean that *Paradox* can handle any database management job you would consider doing on a PC. The files can be linked through common fields (relationships) so that simultaneous updates of multiple files can be made with one entry and reports generated from pieces of various files.

Ambidextrous

Some database programs fly through the job of making formal reports and slip on the looser style of informal queries. Others handle the relaxed que-

Lotus' New Waves

(continued from preceding page)

that keeps track of range names and addresses. A new /Range Transpose command turns column entries into rows and vice versa. Unfortunately, it doesn't adjust relative cell addresses. Finally, you can hop out to DOS without leaving 2.0. Exit <return> at the DOS prompt takes you right back to the worksheet.

No Trespassing

Version 2.0 is strong on security. Each worksheet can be given a password so that only authorized users can load it. Also, a new format command blanks out any cells you want to keep out of sight. Version 2.0's minimum column width is now 0, so even complete columns can be hidden.

For data management, 2.0 has corrected a woeful 1A defect by including a /Data Query Find command that takes you to specific data records. It also does matrix math and regression analysis—operations that used to require heroic work with macros. Finally, 2.0 has a /Data Parse command that separates columns of numbers and labels after you have imported a foreign ASCII file.

The biggest improvement in the print program is a method to include international characters. The Lotus character set is not compatible with IBM's extended character set, but it includes such things as the German sharp *s* and the Icelandic *edh*. You can also embed printer control codes within a worksheet so that a printer can change fonts on the fly.

However, *1-2-3* graphics are still feeble. Version 2.0 lets you explode one slice of a pie chart and gives you a few more color options.

Advanced *1-2-3* users will drool over the 37 new @ functions. Some do depreciation (straight line, declining balance, and sum of the year's digits but not ACRS) and future value calculations, and others do time arithmetic. But the real excitement will be over the 19 new string functions. You can use them to compare, join, modify, and search for text strings. Text strings can be tested for upper- or lowercase, exact length, or content of any kind. These new functions allow you to manipulate labels almost as easily as numbers.

Another godsend is the cell function, which returns all kinds of information about any given cell. The cell pointer function does the same thing for the cell that the cursor is on and will see a lot of action in macros. Now you can learn all about the current cell in a macro, without giving it a temporary range name and testing it five different ways.

Macro Scopic

Version 2.0 has also made a big commitment to macros. The 1A manual devoted only 13 pages to macros, but 2.0 gives them 57—and with good reason. Version 2.0 has 33 new macro commands (seven that replace the old /x commands, bringing the total to 40.) The prayers of many programmers have been answered. You can now pass arguments to subroutines and use simple commands that branch to different subroutines depending on the current status of the worksheet. You can set up FOR-NEXT loops and even check for keyboard input while a macro is running. Also handy, and potentially dangerous, is a command that disables the Break key. If used, no one can stop your macro, so it had better not run amok.

Finally, a few new macro commands let you open ASCII files on disk and transfer data to and from the worksheet. You can do only the most primitive text manipulation with these commands, but along with the other new macro commands, they will keep the bit bashers happy for a long time.

Nobody's Perfect

So what's wrong with Version 2.0? It needs 256K bytes of RAM instead of 192K bytes, which reduces the available memory count by about 90,000. Also, floppy users can't put the system on the program disk, so they can't boot with it. You can, however, install 2.0 on a hard disk so that it runs without the program disk in drive A:.

Surprisingly, 2.0 takes 38.5 seconds to run a macro that 1A runs in 29 seconds. With the 8087 and with the control panel and screen updates turned off, 2.0 just matched 1A's macro speed. Version 2.0's calculations speed, without the 8087, is the same as 1A's.

Finally, 2.0 has a demo disk but no tutorial disk. The tutorial is now a book that you plod through page by page. 1A's tutorial was the best I have ever seen; I bet Lotus will try to sell a tutorial separately for Version 2.0. ■

New *1-2-3* Macro Commands

{BEEP}	{GETNUMBER}	{QUIT}
{BLANK}	{GETPOS}	{READ}
{BRANCH}	{IF}	{READLN}
{BREAKOFF}	{INDICATE}	{RECALC}
{BREAKON}	{LET}	{RECALCCOL}
{CLOSE}	{LOOK}	{RESTART}
{CONTENTS}	{MENUBRANCH}	{RETURN}
{DEFINE}	{MENUCALL}	{SETPOS}
{DISPATCH}	{ONERROR}	{WAIT}
{FILESIZE}	{OPEN}	{WINDOWSOFF}
{FOR}	{PANELOFF}	{WINDOWSON}
{FORBREAK}	{PANELON}	{WRITE}
{GET}	{PUT}	{WRITELN}
{GETLABEL}		

Lotus' *1-2-3*, Version 2.0, has added extensive macro capabilities, including the 40 additional commands listed above.

ries well, but fall down when asked to do extended formal reports. *Porodox* handles both tasks very well. Informal queries come back as quickly as you can put check marks into the boxes on the screen, which represent the fields you want to see and conditions you want to use. You create more-complex formal reports using either scripts recorded from your keystrokes or by using a programming language called PAL (*Parodox* Application Language).

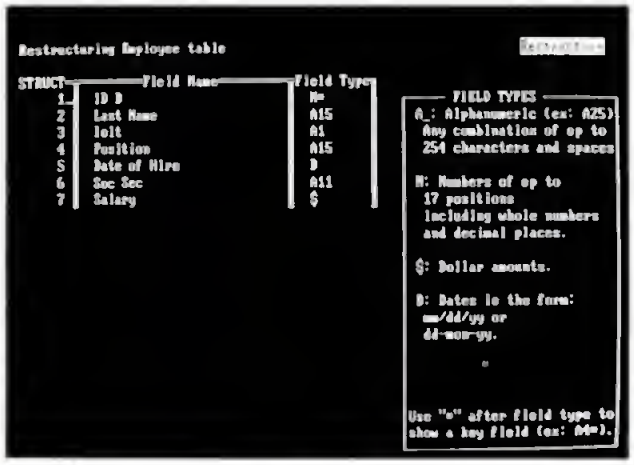
If you want to do special graphics or if you like to get in there and write your own code, the *Parodox* Application Language is very complete. PAL is full of conditional statements and manipulation commands and it includes present value and other financial functions as well as variance and common statistical functions. The *Parodox* language gives you strong tools to design screens that make full use of the IBM monochrome and color/graphics displays and to print reports with different lines, tables, and headings on different pages.

Familiar Commands

If you learned to use your PC with such popular applications as *Multiplan*, *1-2-3* or *dBASE II*, you'll find yourself at home with *Porodox*. For *Multiplon* and *1-2-3* users, it has a familiar two-line menu on the top of the screen that tells you what the options do as you slide through them. The Esc key gets you out of trouble and the F1 key helps you with whatever function you are in at the moment. Ansa has even supplied a plastic function-key overlay to help you remember that F2 is "Do-It!" and F10 is "Menu."

The *Porodox* Applications Language keeps the same syntax as *dBASE* and adds commands and conditions. *Porodox* can import and export files from *1-2-3*, *dBASE*, *Symphony*, the *PFS* series, *VisiCalc*, and programs using ASCII files.

One thing is intimidating about *Paradox*, however: its memory requirement. This thing wants to live in a minimum of 512K bytes of RAM. Say goodbye to RAMdisks, print buffers, and hot-button programs. For complex queries, the manual suggests you have a megabyte free on the hard disk for *Porodox* to use after you load the 750K bytes of program code.



Paradox is set up to allow fast and trouble-free changes to the structure of existing data tables. Its field types are coded for an easy read.

Best Friends

But once you have it rolling, this program is forgiving and responsive. It almost begs you to walk through the menus, and you can back out and maneuver through the data quickly because of the frequent prompts that appear on the screen.

Poradox even allows you to see a kind of instant replay by scrolling through previous screens. The program uses all of that RAM to form screen images. You can page through these images to see what you have done to get where you are. You can also back up to change a step in the process without starting the chain all over again. The use of these images and a lot of buffering of data in memory means that the screens appear very fast.

At $695, *Porodox* isn't something you are going to buy just to do a little minor file management with, but if you want both musele and easy maneuverability in a DBMS, *Paradox* might well be the animal you've been searching for. ■

Paradox
Ansa Software
1301 Shoreway Rd.
#221
Belmont, CA 94002
(415) 595-4469
List Price: $695
Requires: 512K RAM. DOS 2.0 or later

IBM Entices Dealers With Rebates on PCs

BY VIRGINIA DUDEK

NEW YORK—In an apparent effort to move more PCs by year-end—especially those with hard disks—IBM is pushing a dealer discount and rebate program. But whether dealers will pass savings on to buyers remains to be seen.

From September 1 until December 31, dealers can receive up to $350 (or 6 percent) off the price of the PC AT, $300 (or 8 percent) on the XT, and a $174 discount on the PC*jr*. Discounts on the XT and AT apply only to hard disk versions, a possible move to entice dealers away from selling non-IBM hard disks in IBM PCs.

To receive discounts, dealers must order 70 to 100 percent as many XTs and ATs in the final 4 months of this year as they did in the first half.

Misplaced Incentives

Retailers have mixed views on how appropriate the solution is to the problem of a sluggish market.

"It creates incentives in the wrong place," says Larry Stein, president of Prodigy Systems Inc. of Edison, N.J. Stein believes a customer rebate program would be a better idea because dealer rebates just offer incentives to the dealer to move inventory. In tum, dealers must offer discounts in anticipation of receiving a rebate from IBM.

"Dealers are better off buying additional machines after they sell them, rather than before," he adds. "It's smart to give the customer a rebate and allow the retailer to make a reasonable margin. It would still drive customers into the showroom and put less pressure on retailers to give away profits."

Retailers have mixed views on how appropriate the solution is to the problem of a sluggish market.

To qualify for a discount, dealers must order seven PC ATs in the final 4 months of 1985 for every ten ordered in the first 6 months. For the XT, dealers must order eight now for every ten ordered in the first 6 months. To qualify for the maximum discount, AT orders must be at the rate of eight for every ten in the first 6 months, and XT orders must be at the rate of ten for every ten ordered in the first 6 months.

IBM would not comment on the program, saying it was a "confidential matter." However, a spokesperson did confirm the existence of a promotional program for PC XTs, ATs, and PC*jr*s. ■

NEWS IN BRIEF BY JANE MINTZER

Mountain Peaks with Internal Hard Disk Card . . .

Mountain Computer Inc. has taken the capacity lead among internal hard disk vendors with the announcement of DriveCard, the first internal 20-megabyte hard disk system mounted on a card that requires one and a half card slots. The $1,195 DriveCard integrates a 3½-inch Winchester disk with controller electronics and is designed for the PC, XT, and compatibles. DriveCard draws 15 watts.

Mountain Computer points out that the half-slot portion of the unit fills the nonconnector half of a full card slot, leaving the connector open to accept another half card.

Mountain Computer's DriveCard, a 20-megabyte internal hard disk system mounted on a card, has a list price of $1,195.

"We think that in the PC industry, the 20-megabyte card is already a standard in terms of what the users want and in terms of the amount of memory necessary for data storage," says Bob Werbicki, engineering manager for storage products at Mountain Computer.

Another vendor that has entered the internal hard disk market is Plus Development Corp. of Milpitas, Calif., which recently announced the Plus Hardcard (see the Downtime column in this issue, page 54).

The DriveCard was scheduled for October availability. A 10-megabyte version is available for $995. The systems carry a 1-year warranty. *—Virginia Dudek*

Connecting Overseas . . .

EasyLink subscribers in the United States can now electronically communicate across the ocean to the United Kingdom. **Western Union** says that its electronic business communications, database, and information service is the first public electronic-mail service to allow such a two-way connection.

Western Union says that the 120,000 U.S. EasyLink subscribers can send and receive a mailbox, a telex, or a Mailgram message from a U.K. subscriber. EasyLink in the United Kingdom is based on the U.S. version of the software and is being marketed and supported by Cable & Wireless EasyLink Ltd.

Joseph F. Norton, assistant vice president for EasyLink Product Management at Western Union, says that this new service will give EasyLink subscribers in the United States "a very direct and compatible means of communication to any U.K. EasyLink subscriber." He says that many of the 5,000 current subscribers are American companies with branch offices in the United Kingdom.

To send an EasyLink message from the United States to the United Kingdom costs 25 cents per 1,000 characters plus a 40-cent-per-message fee and WATs charges if applicable. From the United Kingdom to the United States, an EasyLink mailbox message costs a flat fee of 31 pence and an additional 7 pence per 100 characters (approximately 40 cents plus 9 cents). The rates drop during off-peak hours to 22 pence plus 5 pence per 100 characters (about 31 cents plus 7 cents). For 5 pounds sterling (approximately $6.75, U.K. users can send a Mailgram message to the United States (each additional page costs 2 pounds).

For further information contact Western Union at One Lake St., Upper Saddle River, NJ 07458, (201) 825-5000.

Ready for the Big Leagues . . .

Living Videotext's *Ready*, a memory-resident outline processor, sold out its first production run with 25,000 orders for 20,000 copies, according to company president Dave Winer.

Winer, who says he was "blown away" by the response, credits it to distributor competition and timing of the product. "The market for resident software has matured," he says. "We are now seeing the second generation of resident software."

Winer says *Ready*, listed at $99.95, was developed as an OEM product, adding that other agreements will follow the current bundling of *Ready* with a Mouse Systems mouse. *—Charles Bermant*

Okidata Rolls Out Printer for Telecommunications . . .

Okidata has responded to the growing needs of the telecommunications industry by introducing the specially designed Microline 182 TTY printer to handle the special demands of telecommunications applications.

The ML 182 TTY, similar to the standard ML 182, prints at 120 characters per second (cps) in utility mode and 60 cps in the emphasized and enhanced mode. While the printer is in TTY mode, it will respond only to carriage returns and line and form feed commands and it will ignore any extraneous commands that could delay the printer. In addition, page-formatting commands are addressed when the printer is in CRT mode and other character format commands are acknowledged when the ML 182 TTY operates in basic printer mode. These modes can be changed with a DIP switch.

The ML 182 TTY features selectable intelligence levels to allow a single printer to be used for multiple applications.

The ML 182 TTY with a parallel interface and 120 volts costs $349 (with 220 or 240 volts the price is $385). The ML 182 TTY with a serial interface and 120 volts costs $409 ($450 for the 220 or 240 volt model). More information can be obtained from Okidata, 532 Fellowship Rd., Mt. Laurel, NJ 08054, (800) OKI-DATA or (609) 235-2600.

New Hard-Diskless AT Clone . . .

Another IBM PC AT clone is on the market—this time from **PC's Limited.** The PC's Limited AT costs $1,995 (not including a monitor) and has a 1.2-megabyte floppy drive and a combined floppy and hard disk controller card for add-in drives (there is no hard disk).

Two serial ports, one parallel port, a clock/calendar, and 1,024K bytes of RAM are all consolidated on the motherboard to reduce the need for expensive add-on cards, and to free up other slots, according to the manufacturer. The Intel 80286 chip runs at 6 MHz, and an 80287 math coprocessor can be added.

A company spokesman estimates that 100 orders for the AT-compatible are coming in everyday. PC's Limited is headquartered at 7801 N. Lamar, #E-200, Austin, TX 78752, (512) 452-0323. ■

PC's Limited's AT-compatible has a 1.2-megabyte floppy drive and costs $1,995.

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PC11

CIRCLE 492 ON READER SERVICE CARD

PC UPDATE BY VIRGINIA DUDEK

NEW YORK - Microeoft Corp. of Bellevue, Waeh., hae enhanced Multiplan, ite beet-eslling spresdshset progrsm. Version 2.0 offere 8087/80287 math coproceseor eupport, keyboard macroe, built-in mouee support, and an expanding csll pointer to highlight csells in which a command ie performed. Multiplsn can also read and write 1-2-3 filee. Vereion 2.0 usee sparse cell memory management, and its worksheet size is now 4,095 by 255 celle. A nsw tool, csllsd model consolidation, usss s single command to combine ons or more spreadsheets with the esme format. It's s built-in feature, not a macro, and is useful for report eummsries. Current usars snd those with ths Texss Inetrumsnte version can upgrade for $50. Updates are free if you purchased Multiplan after July 15, 1985, or frss with purchases of Microsoft Chart.

* * *

IBM has updsted the Pereonal Decieion Seriee of integrated productivity tools. Thsse updatss maks PDS sssisr to uss with Dieplay Write, IBM's word procssing system. Among the changee: WORDS Edition now converts WORDS documents to revisable-form-text documente, which may then be used by DisplayWrits 1, 2, or 3; DATA Edition provides a procedure for inetalling DisplayWrite on the PDS main menu; REPORTS+ ueee logical and global operatore with charscter fields for record eelection; PLANS and PLANS+ havs columnsr arithmetic snd a grsph optione menu. Updates are $20 for extended-support subscribsrs, $45 for non subecribsrs, and frss for buysrs who havs warrsntiss datsd on or sftsr Sspt9mber 17, 1985.

* * *

Goldata Computer Servicee of Bryn Mawr, Psnn., hss improved ths LAN vereion of GOLDATAbaee dstabase management eyetem. Version 6.0 includee LAN facilitiee thst srs compatible with record locking, file locking for multiple users accessing s common databass simultsnsously, usar-dsfined menus, and customized input screens. "We've used the Novell Nstwars snvironmsnt to bring LAN database management to ths non-progrsmmer," eays Elliot Goldberg, GOLDATA president. Version 6.0 runs on 24 different networks, including 3-COM, ArcNet, and IBM. Upgradse are $50.

* * *

TGL Inc. of Corvallis, Ore., has rsleased Version 2.0 of The Converter, a program that automatically converts Apple, UCSD, MT+, Turbo, and MS-Pssc9l source programe into squivalsnt C programs. The Converter expsnde the eoftware developer's base of machines, operating syetems, and manufacturere. For example, usars can now move from UCSD p-Syetsm to MS-DOS; from MS-DOS to UNIX; snd transport a variety of Pascal programs to other opersting systeme. Call TGL at (503) 745-7476 for updstss.

* * *

Short takee: DCA of Alpharetta, Gs., announced that IRMA's FASTLINK high-speed modsm is compstible with SIMPC, a micro-to-mainframe package that gives the PC and compatibles complete 3270 emulation ... Qusdrsm Corp. of Norcross, Ga., will bundle PolyWindows DeekPlue desk organizer with esveral Quadram products, including the Quadboard, Gold Quadboard, Silver Quadboard, and Qusdsprint ... SPSS Inc. of Chicago has enhanced ite etatietical and rsporting software. SPSS/PC+ now has fils-hsndling fsatures that join, add, msrge, and sort files plus a utility that adds mors flexibility in msnaging ths workspace environment. Nsw vsrsions within the product lins includs SPSS/PC+ TABLES for displaying and summarizing data for use in a tsbular format and SPSS/PC+ ADVANCED STATISTICS for psrforming MANOVA, discriminant, and other multivariate procedures. Call SPSS for updates.

PC Update reports on software and hardware enhancements. To contribute, write or call Virginia Dudek, PC Magazine, One Park Ave. New York, NY 10016 (212) 503-5265.

Sperry's IT vs. IBM's AT: It's Cheaper and Faster

BY VIRGINIA DUDEK

NEW YORK—Sperry Corp. moved into the populous AT-compatible arena with the announcement of its PC/IT, a faster, slightly less expensive version of the IBM PC AT.

The PC/IT uses the AT's 80286 chip and supports the IBM AT 16-bit open architecture standard. The PC/IT has a switch-selection feature.

The basic system has 512K bytes of RAM, which can be increased to 1 megabyte without using expansion slots. The system can be configured with one or two 44.6-megabyte hard disk drives.

Also included are two built-in RS-232C asynchronous communication interfaces. The PC/IT integrates into Sperry and IBM central processors using hardware and software interfaces provided by Sperry.

One distinguishing feature of the PC/IT is that it can operate with the XENIX System V, a version of UNIX. It can support up to nine users or link to a Sperry or IBM mainframe computer.

"The UNIX feature will help the machine with additional applications software," says Edward Poshkus, president of Creative Strategies Researeh in San Jose, Calif. "But price is the overriding factor in its success or lack of success."

Sperry will sell the basic PC/IT with 512K bytes of RAM, a 1.2-megabyte floppy disk, and a monochrome display for $4,340. The multiuser configuration is $6,834 per unit and includes 1 megahyte of RAM, a 1.2-megabyte floppy disk, a 44.6-megabyte hard disk, a monochrome display, and a multiterminal adapter.

Analysts on the whole seem optimistic about the general market for ATs.

"We expect the market for AT compatibles next year to leave room for Sperry to sell a significant number of AT compatibles," says Tim Williams, senior analyst at Future Computing. He feels that with support of XENIX System V, Sperry will eventually attract a large number of users. ■

Sperry's PC/IT operates at 6, 7.16, or 8 MHz. With 512K bytes of RAM, monochrome monitor, one 1.2-Mbyte floppy, it's $4,340.

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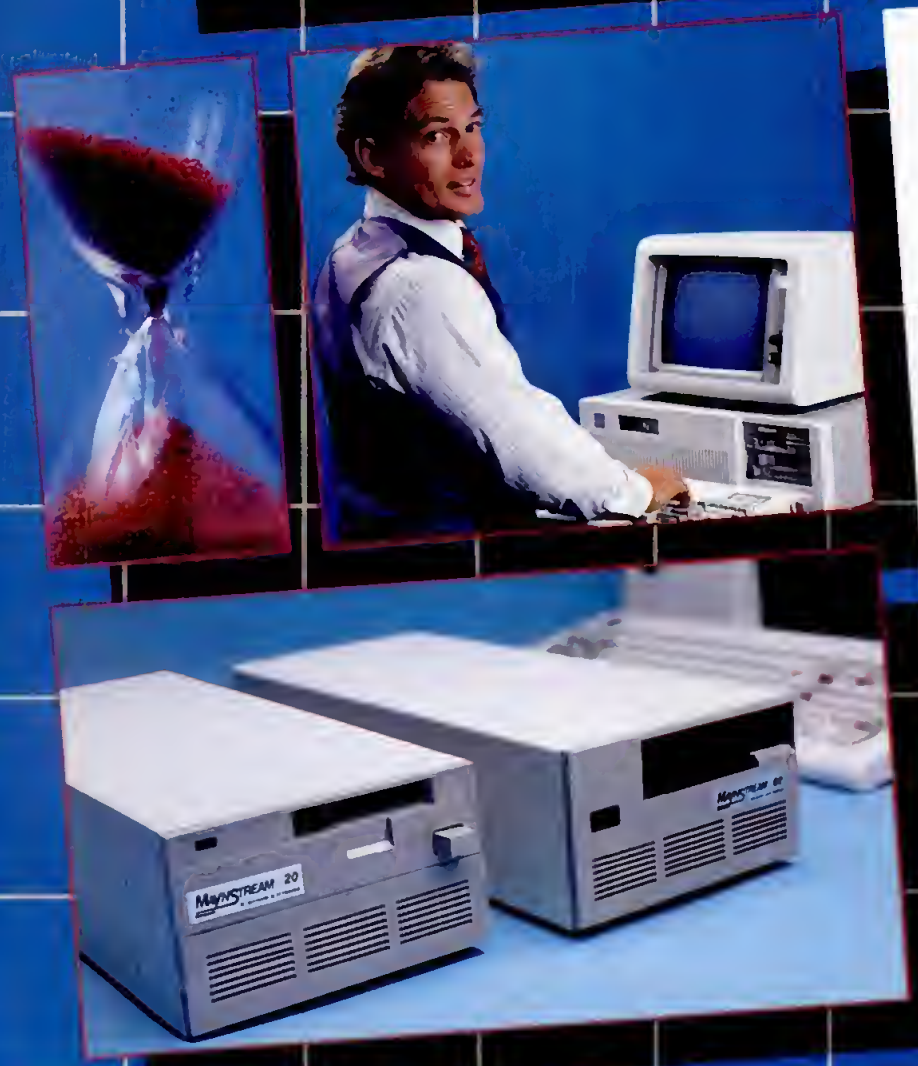

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*Actual time 2 min/57 sec Total files backed up 376 consisting of 10,002,432 bytes Computed on IBM-PC with 512K memory and one 10MB hard disk drive Your actual back-up time may vary

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CIRCLE 489 ON READER SERVICE CARD

First new 1/4-inch cartridge since 1971

If you *don't* have data worth preserving, then the reasons for buying Cartrex's new 1/4-inch, high performance, virtually error-free tape cartridge won't mean anything

But, if you are one of the many 1/4-inch tape cartridge users that assume 3M's cartridges just *have* to be "good enough" for today's high performance tape drives, read these simple facts to understand why that isn't true anymore.

The new Cartrex 1/4-inch tape cartridge is the first new tape cartridge design in almost a decade and a half. Tape drive manufacturers now have a new cartridge technology which allows them to advance beyond this previous artificial barrier.

PILOTS HAVE A SAYING, "There are those who have made a wheels-up landing—and those who will." You can apply this expression to those who have lost data and those who will. Unfortunately, data loss isn't always because users haven't backed-up their hard disk. Sometimes it's because their 1/4-inch tape cartridge, where they back up their hard disk, developed hard errors—those insidious errors that tend to increase over time. That's why Cartrex has developed a 1/4-inch data cartridge for today's high performance drives that virtually eliminates errors.

Why a new cartridge

When 3M announced its cartridge in 1971, it was designed for a low capacity tape drive with less than 3 megabytes—2.88 to be exact. The tape was low in density—1600 bits per inch with only 4 tracks and 300 feet of tape.

The tolerances required for the tape drives of the early 1970's were fine for then, but today's tape drives require much tighter tolerance. Today's tape cartridges must work with drives that have 9 or more tracks and bit densities as high as 12,000 bits per inch on 600 feet of tape. That means capacity increases of 2,000 percent packed into the same cartridge.

The reasons that yesterday's cartridge technology simply won't work properly in today's high capacity drives is inherent in the cartridge design.

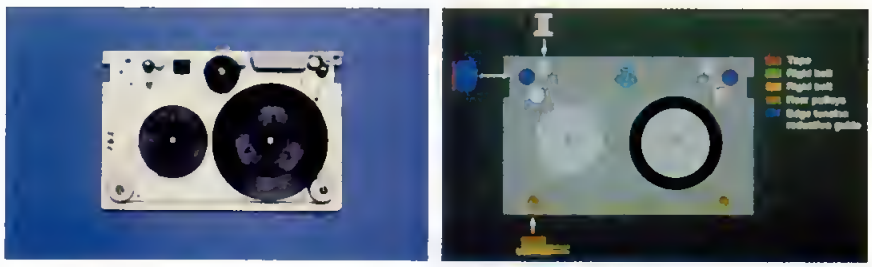
With the significant increases in capacity, the three culprits that make cartridge tolerances so important are fluctuating tape tension, redeposit nodules, and instantaneous speed variations (or ISV).

Tape Tension

Any child who has played with a magnet understands that as the magnet is separated from metal, the magnet's ability to work is decreased. So it's no surprise to find out that the closer the tape drive head is to the tape, the better the reading. This closeness is particularly important when the embedded iron filings get packed tighter in today's high density tape.

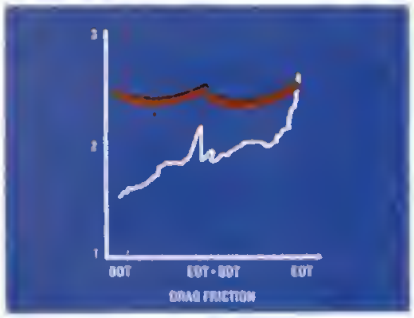
It's also important with the increase in the number of tracks. After all, you wouldn't want the head to be reading an adjacent track any more than you'd want it reading more than one magnetic representation of a bit.

Unfortunately, tape tension historically has not been constant. As the tape unwound, the tension increased. What's important is both the *amount* and *range* of tension. A fluctuating increase or decrease in tension is as unacceptable as low tension is in the first place. As the accompanying graphs



The Cartrex cartridge design (upper left) uses the N2 principle which creates head-to-tape tension by applying a mechanical differential at the rear pulley between a stiff transport belt and a stiff tensioning belt, indicated in green and yellow in the color schematic (upper right).

The conventional 3M design applies drag at the rear pulley to create tension, which creates heat, and limits future speeds much above 90 inches per second.



Good head-to-tape tension ensures the highest probability of reliably capturing data. Fluctuating tape tension allows data loss due to head-to-tape separation and smearing redeposit nodules across the tape head. The Cartrex cartridge, compared to the conventional design, creates constant and higher tension.

show, the Cartrex cartridge has higher tension and flatter profile than the 3M cartridge. This means more reliable data across the entire tape.

Redeposit Nodules

Another reason to keep constant tension is to avoid "redeposit nodules" from smearing across your tape drive's head. What are redeposit nodules? They are the insidious flakes of tape media that break off from the edges of the tape and get dragged up to the edge of the tape head. If the tension is low, or becomes low when the tape starts or reverses, the flakes come up over the edge, get smeared over the head, and reduce its ability to read the data.

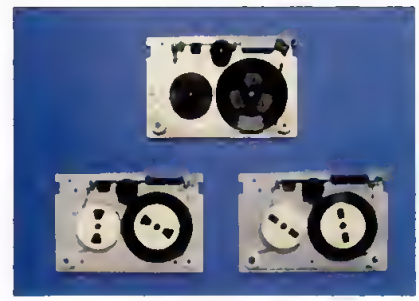
Even worse, however, is that these redeposit nodules are dragged along the surface of the tape and get embedded and packed over time. When your drive tries to read the data, the redeposit nodules act as a tent pole holding up the tape away from the head. As a result, even the best error-recognition algorithm can only tell you one thing—you've lost the data.

You might be wondering what causes the flaking in the first place. Again, it is cartridge design. The basic design uses a tape guide, shown in the accompanying illustration. The problem with this approach, is that it presupposes that the tape will always run parallel to the top and bottom caps of the tape guides. At the low speeds of 30 inches per second typical of when the 3M cartridge was designed, it was less of a problem. But at today's speeds of 90 inches per second and more, the tape wanders. When it presses against the top of the tape guide, the tape's edge pressure builds. Not only does media flake off, but you lose data due to the "coining" or "scalloping" effect.

Cartrex eliminated the cause of the tape coining or scalloping by developing a barrel-shaped roller placed prior to the tape guide. The laws of physics show that by riding on a rounded barrel, the tape will always seek the middle, reducing the tape edge pressure. This seemingly simple addition causes the tape to always enter the tape guide with zero edge pressure. In this way, the possibility of media flaking off and creating redeposit nodules is virtually eliminated.

Instantaneous Speed Variation (ISV)

Instantaneous speed variations is exactly what it sounds like—small, instantaneous changes in tape speed as it crosses the tape head. At slow tape speeds and low bit densities—like the 1971 standard of 30 inches per second and 1,600 bits per inch—ISV wasn't as big a problem. At that time, the bits were crossing the head at 48,000 bits per second.



You can compare the Cartrex design on top with the conventional 3M design (lower left) and DEI, a 3M licensee (lower right). The omission of "edge tension reduction guides" (indicated in dark blue on the color schematic) on either the 3M or DEI design means that tape edge pressures will increase causing the mognetic media to flake off, smear across the tape head, and cause "redeposit nodules" to become embedded in the tape.

Today, however, the story has changed. 90 inches per second and 8,000 bits per inch mean that 720,000 bits cross the head every second. A 1,500% increase.

As you may have guessed, speed fluctuations in the 48,000 bits per second made reading data difficult for tape drive electronics. But when the electronics have to guess whether or not the bit rate of 720,000 bits per second is accurate, the electronics can become overwhelmed.

High speed tape without the "edge pressure redncton guide" seldom enters tape guides parallel to the top and bottom. The edge pressure which results creates "scalloping" or "coining" on the tape. The effect is data loss due to head-to-tape separation, flaking media that smears across the head, and "redeposit nodules" that create hord errors.

Never a Single Issue

Your tape drive seldom has the luxury of dealing with an isolated problem. It's usually a combination of ISV, redeposit nodules, and tension problems all together. Now you understand why Cartrex wanted to develop a cartridge for a market that needed a modern alternative.

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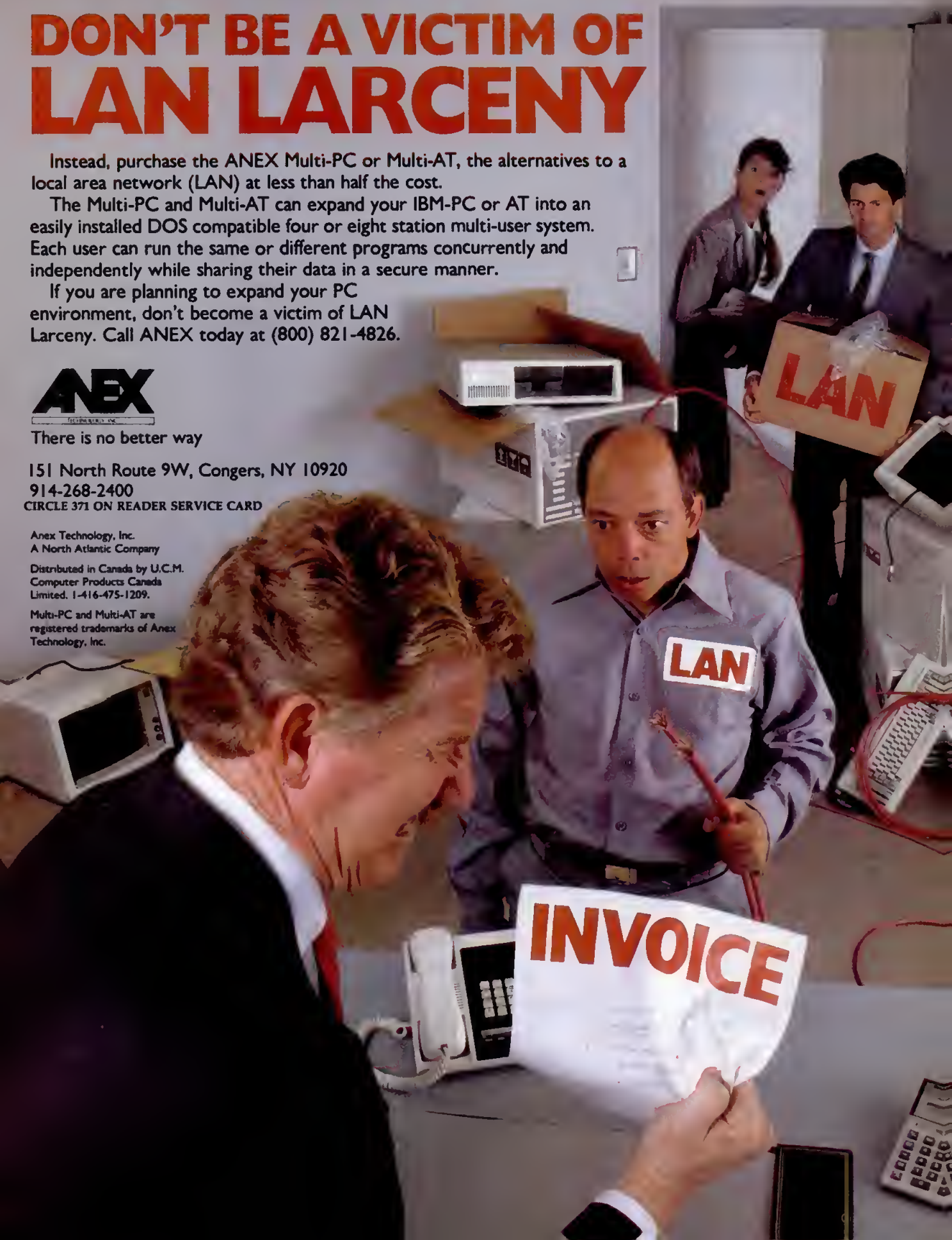


Freelance Enhances the Look of Lotus Graphs

BY DAVID HOFFMAN

WALTHAM, Mass.—Graphic Communications Inc. (GCI) has announced a powerful and flexible graphics software package that may take PC business graphics one step beyond its current state.

Freelance can create images from the ground up, but its biggest appeal is that it can import ASCII text and *1-2-3* .PIC files directly as well as graphic files created with *Graphwriter*, an earlier product from GCI. Lotus *1-2-3* and *Symphony* users with sophisticated graphics requirements will benefit from *Freelance*'s use of a *1-2-3*-like menu interface and tools for enhancing existing graphs.

When *1-2-3* was introduced several years ago, microcomputers were not yet found extensively in large corporations, and business users were easily impressed by the instantaneous pie, bar, and line charts that were generated from numeric data in the spreadsheet. Many users became hungry for more power and were frustrated by *1-2-3*'s paucity of colors and crosshatch patterns, the few options for fonts and placement of titles and labels, and the inability to merge graphs onto one page.

Graphic Gaps

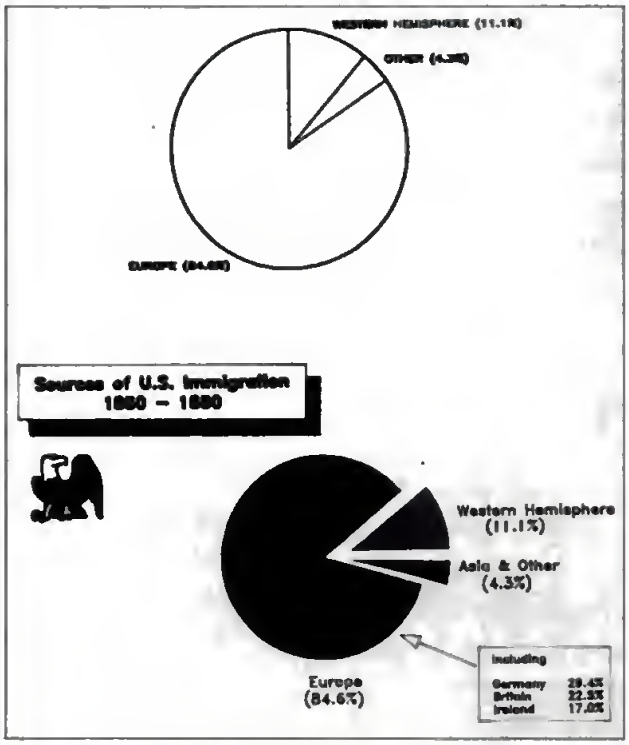
Leading programs such as *CHART-MASTER* from Decision Resources Inc., *Micrasaft Chart*, and GCI's *Graphwriter* moved in to fill the gap by allowing enhanced graphs to be created from data in existing spreadsheet, text, or *dBASE* files. Furthermore, they support graph types such as Gantt, bubble, and PERT that are not included in *1-2-3*. Programs such as *PC-Draw*, *DIAGRAM-MASTER*, and *GEM Draw* allow free-form graphic design, but they can't deal with numeric information and are limited in their ability to manipulate existing images. *Freelance* is a significant advance because you can take a chart that has already been drawn in *1-2-3* .PIC format, manipulate all its elements individually, add text or symbols, and generate high-resolution output directly to slides or plotter.

David Tarrant, GCI's president, emphasizes that his company's products are object-oriented as opposed to pixel-based. Many graphics programs treat an image as a grid of dots (pixels), allowing limited editing possibilities. With *Freelance*, you can individually size, reposition, or copy every logical element or group of elements, including text. *Graphwriter* was released 3 years ago and uses the same object-oriented techniques.

Tarrant says that executives need to combine conceptual diagrams, charts, and textual material in most cases. They frequently need to customize charts from off-the-shelf packages or to merge them. It was also important to support high-quality output devices such as film recorders and plotters at their best resolution. Tarrant believes *Graphwriter* and *Freelance* offer better integration of business graphics functions than the competition. He calls the combination "untouchable."

Tarrant claims sales of *Graphwriter* have tripled in the past year. *Freelance* is the perfect complement to *Graphwriter*, and early corporate testers seem pleased. Robert Ziemann, staff manager at AT&T Communications, says, "I have never been so excited about a product. The best features of all the graphic products have been incorporated into one product—*Freelance*."

A prerelease version of *Freelance* obtained for review proved quite easy to use. Anyone comfortable with the point-and-choose style menus in *1-2-3* will be creating pictures in an interactive environment within minutes. Once an image has been retrieved from disk by *Freelance*, its elements can be moved, rotated, replicated, scaled, or modified. Font styles and sizes for text can be changed, and new type can be added. Drawing tools, such as custom grids and rulers, are provided to aid in the placement of elements. *Freelance* comes with a library of over 200 common symbols including U.S. state maps, separate or united. Custom libraries can be created, and symbols are readily merged into existing images.



A pie chart created by 1-2-3 *(above) can be enhanced with* Freelance, *a $395 graphics program that generates colorful, sophisticated graphs (below).*

Power Tools

If output were limited to the computer screen, these tools would be much less useful. *Freelance* does support IBM's Enhanced Graphics Adapter (EGA) as well as the standard IBM and Hercules graphics cards, but it really shines when outputting to a film recorder or plotter. *Freelance* slides made on the popular Matrix film recorders or the Polaroid Palette film recorder are of very high quality, not mere screen dumps. The program supports best-selling plotters from Hewlett-Packard, Calcomp, IBM, and Houston Instruments; tests showed the plotting routines to be remarkably fast. *Freelance* supports the HP Laserjet printer and IBM Color Jet Printer as well as other well-known printers from IDS, Epson, and Okidata. Although you can use *Freelance* fully through the cursor keys, it does support the Summa Graphics Tablet and mouses from Microsoft and Mouse Systems.

Freelance runs on the IBM PC, XT, AT, and compatibles. The program requires 256K bytes of RAM but will take advantage of more memory if available. Its was scheduled for release in October, with a price of $395. *Graphwriter* retails for $395 and an extended version containing additional chart types costs $595. GCI can be contacted at 200 Fifth Ave., Waltham, MA 02254, (617) 890-8778. ■

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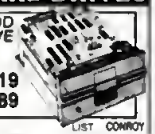

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Microsoft Access: Power Offset by Slow Responses

FIRST LOOK

BY M. DAVID STONE

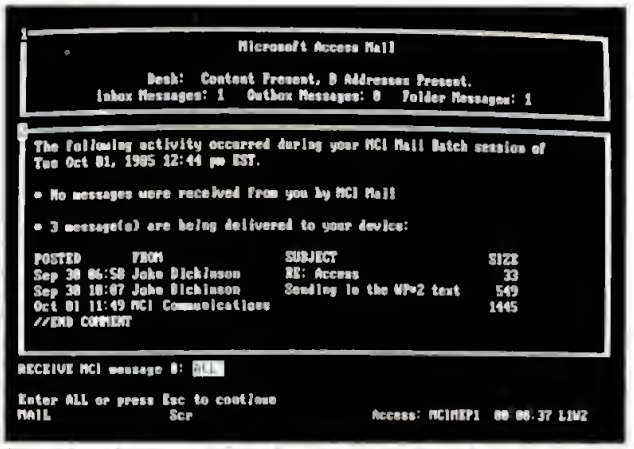
Microsoft's *Access*, the long-awaited, "next generation" communications program, is powerful piece of software, but it's also slow. And it's hobbled by both a cryptic menu structure and a less-than-helpful manual.

What makes *Access*, priced at $250, different is its script language. A script language is a programming language that is specialized for communications in the same way that the *dBASE II* language is specialized for database management.

Script languages are not new, but Microsoft has taken the concept further, both by including more commands and by designing *Access* to generate scripts automatically.

The trick is accomplished through a "learn" mode. You turn on the learn mode and walk through a communications session, and then *Access* will create a script for you.

In addition to creating scripts on demand, the program comes with predesigned scripts for CompuServe Executive Information Service, Dow Jones News/Retrieval, NewsNet, the Official Airlines Guide, EasyLink, and MCI Mail.



Microsoft supplies a number of prewritten Access scripts for on-line services including one for MCI Mail

Each of these six scripts include customized menus that nearly eliminate the need to learn the command structure of the on-line system.

The cost for all these features is speed and size. As shipped, the *Access* files take up just over 750K bytes. As for speed—even when running off a PC AT hard disk, the program is noticeably slow when moving from module to module.

There is also the matter of the Microsoft approach to menus. This approach includes such conventions as letting you leave an options menu in either of two ways, one of which results in the program ignoring all your changes without warning you about it.

The menus also suffer from a cryptic internal logic. This logic might not be a problem if the manual explained things well enough, but it doesn't.

Another important minus is that *Access* is copy-protected in a way that will not let you remove the installation once it has been done. Since you can make a total of two installations, you can easily find yourself without a working copy for your hard disk (just ask an AT owner who has had hard disk problems).

Access, which requires 256K RAM and DOS 2.0 or later, is probably best thought of as the *MultiMate* of communications programs: appropriate primarily for large corporate users. For most individual users, I suspect, the additional capabilities just aren't worth the $250 price tag. ■

PC ADVISOR EDITED BY GUS VENDITTO

PC Advisor is a regular feature that helps readers choose the best hardware and software to meet their needs.

Two Printers, One Port

At the suggestion of the printer issue (Volume 4 Number 19), I just purchased an Okidata 92, and so far I'm extremely happy with it. My problem is that I now have two printers and only one printer port. Like many, I'm on a limited budget and try to save bucks when I can, so I am looking into making my own switch box. Can I just purchase some cable and splice the two cables to the same connector that goes into the PC?

Steve Kravetz
Brooklyn, New York

We don't know what would happen if you tried splicing the two cables, but you probably wouldn't be pleased with the results. Printer cable is a bit more complex than, say, audio cable.

Switch boxes are not as expensive as you may think. Of course, there are many overpriced products on the market and some outfits charge as much as $250, but the Hadax PC Switch, AB Model, has a list price of only $99.50 for parallel connections and $95 for serial ports (Hadax Electronics, Glen Cove, NY 11542, (516) 676-3386). The Black Box Corp. (Pittsburgh, PA 15241, (412) 746-5500) sells an ABC PC parallel switch (SW018) for $99.50.

If you're very familiar with this type of circuitry, you could build your own box, but if you're an electronics novice, this would not be a good time to experiment.

Junior's Assembler

I am impressed with the User-to-User and Programming columns in *PC Magazine*. I'd like to enter some of the assembly language programs mentioned, but I'm not aware of any for the PC*jr*. Can you help me? I know that Juniors are more or less day-old bread now that IBM has socked it to us PC*jr* owners, but I hope your magazine won't forget us entirely.

Stephen Day
Roswell, New Mexico

*PC Magazine won't forget you and IBM hasn't—entirely. IBM's Macro Assembler, Version 2.0 [IBM Entry Sys., Armank, NY 10504; (914) 765-1900; list price $175] is compatible with the PC*jr*, as long as you're running DOS 2.0 or later and have 128K bytes of RAM. Assembly languages from Microsoft and Phoenix will also run on the Junior, but IBM's latest version was the editor's choice when* PC Magazine *reviewed the newest assembly languages in the October 29 issue (see* PC Magazine, *"Pragramming Makes Sense for Business," Volume 4 Number 22).*

*In fact, because assembly language—unlike other programming languages—translates directly into the machine language of the 8086/8088 microprocessor that pawers both the PC and the PC*jr*, there's no better way to get the mast out of your Junior than to became praficient in it.*

If you have a question about products available for the IBM PC, the PC Advisor may be able to help. This column will research the topic or questions and make recommendations. Send your queries to PC Advisor, *PC Magazine*, One Park Avenue, New York, NY 10016. Individual replies are not possible. ■

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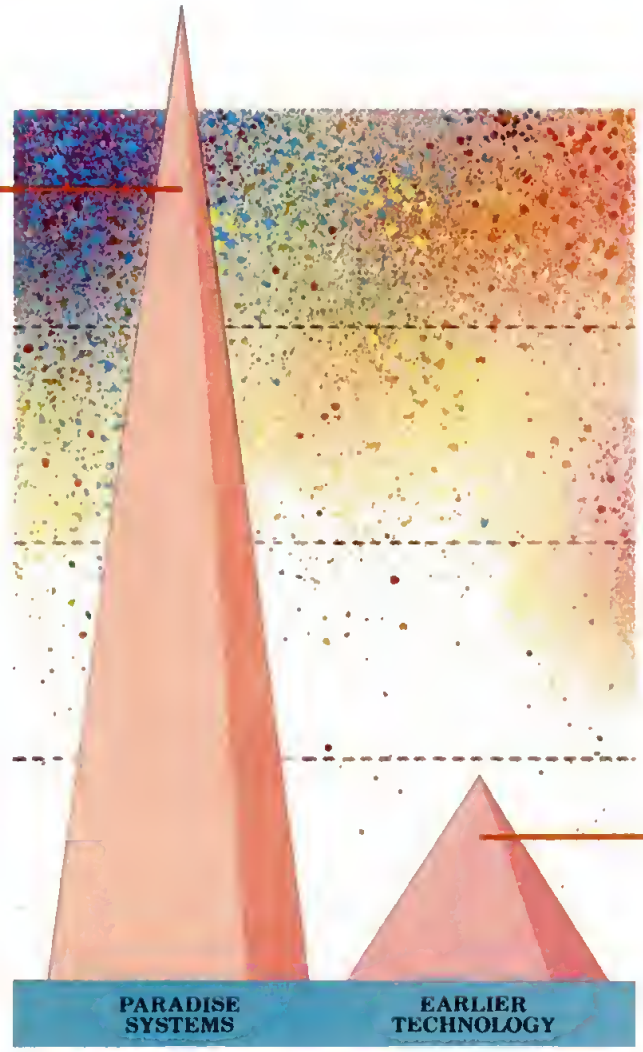

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CIRCLE 126 ON READER SERVICE CARD

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COMMUNIQUES by CHARLES BERMANT

Turn Your Monitor and Cough

Chicago may be the only place in the country where humans and computers can receive equivalent care when they are ill. The MicroAge franchise there now runs repair people all over town to heal sick PCs in custom-painted (albeit sirenless) "computer ambulances."

Most of the calls received on the store's hotline are either false alarms or trivial matters that can be solved over the phone. If the computer can't be repaired then and there, it is transported to the MicroAge service center (or "hospital"). Any machine is eligible for the service, and customers can pay an hourly repair fee or purchase a yearly contract. Just like Blue Cross. ■

All You Need Is Lunch

Digital dining, during which a personal computer is used to track restaurant orders, is catching on (see *PC Magazine*, Volume 4 Number 17, page 105), but it seems that where there is a computer there's a chance for computer error.

One such culinary-minded computer in service at a state-of-the-art restaurant in Portland, Ore., refused to accept an order for salad with no dressing and kept sending out orders for one with house dressing. Its human counterpart tried to override the errant order and received an acknowledgement, but no salad appeared. And in the end, it was the computer—and not the patron—who essentially "ate" the order. ■

Reverse Logic

One great selling point for software and hardware products is that they make a micro act like a computer ten times its size and cost. A recent mailing by IBM promoting seminars in Hartford, Conn., took the opposite taek. "Database query, data analysis, report writing, graphics, and time management can all be accomplished without the use of a personal computer," read Big Blue's solicitation. "This seminar will demonstrate these applications and their use with a mainframe computer." ■

PCs on Earth, Goodwill Toward Men

Thoughtware, the Coconut Grove, Fla.-based manufacturer nf training software for personal computers, will make the coming holiday season just a little brighter (and noisier) for PC users. Its Jingle Disk, an animated rendition of holiday scenes accompanied by sounds of festive Christmas carols, is targeted directly at the stocking-stuffer market.

Thoughtware first came up with the Jingle Disk in 1984 when it was used internally as a holiday greeting for the company's customers and employees. This year the folks at Thoughtware decided to share the idea—their own brand of Christmas cheer—with the rest of the world. However, low price is apparently not one of Jingle Disk's hallmarks—it's $9.95. ■

Cheaters Unite

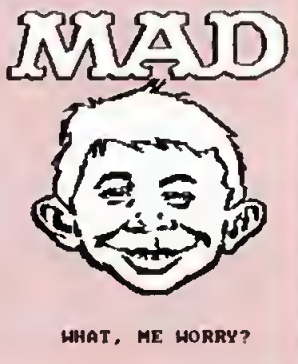
We have found that, in addition to handling the normal proofreading functions of a spelling checker, the utility included in Satellite Software's new *Word Perfect*, Version 4.1, can run a specific-word search that's ideal for crossword puzzles. You can use letters separated by blanks to do a search: Type in K?????T and it comes up with "kumquat" in seconds. ■

Ebonize Printer Ribbon ink spray: For when your printer ribbon gets the dry look.

Illustrations: Heidi King. Photography: Thom O'Conner

Mad About Alfred

Remember the Snoopy and Playmate computer printouts that graced college dorm rooms of freshman computer science students? Now there's *Mad*'s mascot. In its October "special computer" issue, *Mad* magazine printed a 150-line BASIC program that can place the image of Alfred E. Neuman on any graphics-equipped computer screen. ■



Household Hints

For those printer users who would rather recycle a $5 ribbon than buy a new one (and don't mind risking a $40 pair of pants in the process) there is Ebonize Printer Ribbon ink spray. No doubt about it, the ink does darken the old ribbon, but the overspray could do in clothes, desks, and furniture if not used carefully. *PC Magazine* still believes the old saying: Penny wise, pound foolish. So we recommend that if the ribbon is shot, replace it. However, if one spot goes light, a quick burst of WD-40 brings it back. ■

Come Again?

Heard anything unique about PCs lately? Contact PC Communiqués, *PC Magazine*, One Park Avenue, New York, NY 10016; (212) 503-5276; MCI Mail 157-9301. We'll pay you $50 for each item we accept. ■

InfoWorld on EasyLAN
"Any product that brings down the cost and improves the ease of use for LANs is for the better."

Buy A Local Area Network For Less Than $100 Per PC

STOP buying expensive duplicate PC peripherals. Usually your peripherals just sit idle. If your office owns two or more PCs can you justify a costly printer and multiple disk drives for each PC? How often are your printers actually busy? Thirty minutes a day? An hour a day? Even your expensive hard disk is used infrequently.

The obvious solution to avoid expensive duplicate peripherals is a local area network that allows you to share printer and disk drives. But until now LANs have cost in excess of $1,000 per PC.

INTRODUCING THE *EasyLAN*™ OFFICE NETWORK

EasyLAN shares printers and disk drives between IBM PCs. *EasyLAN can save you $1000 or more per PC by eliminating duplicate equipment purchases.* *EasyLAN* advantages:

- ***EasyLAN* shares printers, disk drives, and information**
- **Easy to justify—less than $100 per PC**
- **Easy to install**
- **Easy to operate**
- **Easy to order**
- ***EasyLAN* performs in the background.**

EasyLAN's low price matches the small business user's cost-sensitive budget. It is the office network solution for less than $100 per PC including cables and software. At this price, the RISK IS LOW, and the BENEFITS ARE HIGH.

EasyLAN performs its operations concurrently in the background. *EasyLAN* communications, file transfers and printer operations all take place while each PC simultaneously performs such normal DOS applications as Lotus 1-2-3,™ WordStar™ and dBASE.™

EASY TO OPERATE

EasyLAN network software allows PC users to share printer and disk peripherals. PCs are connected by *EasyLAN* cables plugged directly into your PC's standard serial communication ports and *EasyLAN* can be used with digital PBXs. *EasyLAN* supports geographically separated PCs using modems and dial-up lines.

EasyLAN's performance meets your small office requirements to move word processing documents and spread sheets between PCs. For example, *EasyLAN* can move a 10 page document between two PCs, as a background operation, in less than one minute!

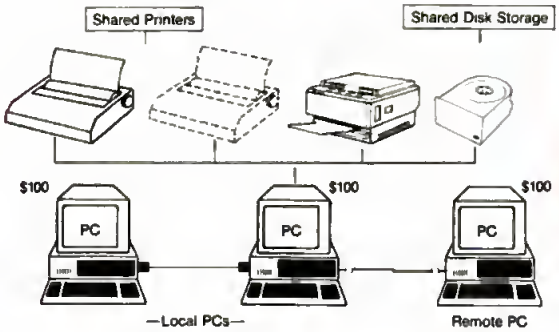
EasyLAN loads automatically at boot time. It manages the PC's serial and parallel ports for communications and printing. All *EasyLAN* operations may be started from any connected PC.

Printer sharing operates transparently with existing programs. Print files are automatically written to disk and scheduled for printing. Multiple printers per PC may be designated for specific office tasks.

For example, one PC can interface with Printer 1 for general purpose output, with Printer 2 for continuous-form letterhead stationery, and with Printer 3 for printing continuous-form invoices.

Disk sharing uses *EasyLAN's* COPY command, *EZCOPY*,™ to move files to and from PCs. Files are stored or retrieved from disk storage and the Directory is updated. *The high-capacity benefits of just one hard disk can now be shared by several PCs.*

All communication operations are protected by a unique password assigned to each PC so security is maintained.



***EasyLAN* Office Network**

EASY SPECIFICATIONS

Each PC in the network requires an individual copy of the *EasyLAN* software, 128k of memory, a serial communication port(s), and DOS 2.0 or above. For your convenience, *EasyLAN* diskettes are not copy protected. *EasyLAN* runs on all IBM PC models (PC, XT, AT, and Jr) and compatible PCs.

"I look for those products that make my job easier and save me and my company money. I believe EasyLAN does both."
Carl Warren
Editor, *Mini-Micro Systems*

EASY TO INSTALL

EasyLAN can be installed in less time than it takes to enjoy your coffee break. Just plug the *EasyLAN* cables into existing serial ports. *EasyLAN's* PRINT, COPY and DIRECTORY commands are very similar to DOS commands.

EASY TO ORDER

EasyLAN is immediately available and easy to order. For a two PC network, start with the *EasyLAN* Kit. For each additional PC in the network, order the *EasyLAN* Expansion Kit.

The *EasyLAN* Kits include program diskettes, manuals and cables, which are shielded to maintain signal quality. All parts are warranteed for one year. *EasyLAN* program diskettes may be purchased individually; you supply your own cables, modem links or PBX connections.

ORDER *EasyLAN* TODAY. 1-800-835-1515 Server Technology, Sunnyvale, CA 94086 408/738-8377

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Bright Ideas Department: Expansion-Slot Hard Disks

Your reaction to a genuinely good idea often depends on your mental attitude, predisposition, and aberrations.

- If you're the inventive type, you may wonder why you didn't think of it first.
- If you believe in cosmic conspiracy, you may wonder if the innovation had been held back by some unknown power.
- If you're smart, you'll put the idea to work.

The genuinely good idea that brings these thoughts to mind is the Hardcard from Plus Development Corp. The underlying concept of the card is a lightning flash of inspiration that incinerates all preconceived notions of Winchester drives. Instead of usurping one of the floppy or hard disk drive slots in your PC—and your patience in putting it there—the Hardcard just drops into a single internal expansion slot. With no more trouble than fitting in a multifunction card, you can boost disk speed ten times and on-line mass storage by a factor of 20.

Coming close behind in the hard-disk-on-a-card race is the DriveCard from Mountain Computer (see "News in Brief," page 36). Mountain's two expansion-slot hard disk models can put either 10 or 20 megabytes inside your PC, at the cost of two expansion slots.

Both of these new space saving products should put your bad notions about new good ideas to rest.

Mount Miniaturization

These disk/cards require the latest in miniaturization technology to bring them to life. They represent the first major production items in personal computing to use surface-mount electronic components. Furthermore, the systems from both manufacturers are based on Japanese 3½-inch hard disk drives that are just now jumping into mass production.

The only way to fit all the circuitry and mechanical components on a single expansion card was to squeeze off unnecessary interface circuitry. Until the disk/cards, hard disks were designed with the goal of universal application, using standard interfaces that could plug them into virtually any computer.

> The 10-megabyte Hardcard hard disk drive takes up one expansion slot, uses 11 watts, and costs $1,095.

Disk/cards have no universal interfaces and are thus irrevocably committed to the IBM PC, XT, and their clones. That commitment is practical only because of the large installed base of IBM-standard computers that could benefit from a hard disk—over 3 million, according to Plus Development.

Overall, the drive/cards represent an interesting turn of events. The IBM influence that hobbyists feared would inevitably lead to a stagnation of personal computer design ideas has actually been directly responsible for making worthwhile hardware innovation possible.

My own experience with the Hardcard proved positive. It was truly painless to install, stole only 11 watts from my PC, and worked like a charm in the PC, XT, and a few compatibles. The only reason I haven't ordered a dozen is because of its dealer-to-you price of $1,095.

The DriveCard is cheaper—$995 for 10 megabytes and $1,199 for 20—but it takes up two expansion slots instead of one and sucks a little more power (12 to 15 watts) than the Hardcard. However, when you install DriveCard in a PC already equipped with a hard disk, the board's built-in controller runs both drives. To top it off, DriveCard can share its second slot with a half-card device designed for an XT's short slot.

Genoa's Good Looks

Another clever idea that recently found its way into my toy box is the Spectrum Graphics Card from Genoa Systems Corp.

The Spectrum's cabilities include standard IBM monochrome and color/graphics (which can be switched with software), advanced color/graphics (640 by 200 in four colors) of the Plantronics color board, and Hercules-compatible monochrome graphics. The Spectrum sweetens the mix with a few delights of its own: flicker-free color scrolling, 132-column by 44-row monochrome text ability (132 columns by 25 rows in RGB color), and text modes that are readable on standard IBM-style displays.

Genoa even includes *Word-Star*-patching instructions and a driver for *1-2-3* to take advantage of the wide, long pages displayed by the Spectrum.

I did manage to find a few bugs. My non-IBM everyday system, with 20-foot monitor cables, did cause problems with the 132-column color screen (the rows did not line up). When I warmed up my standard IBM PC, however, the Spectrum worked as promised. It actually behaves like two monitor adapters—both with advanced features—stuffed into a single expansion slot.

Alas, there's only one monitor plug (along with a parallel printer port), so you can't leave two tubes plugged in at once.

As it is, the Spectrum is a delight. With the ability to keep both displays plugged in, though, it would be a real competition killer. ■

Hardcard
Plus Development Corp.
1778 McCarthy Blvd.
Milpitas, CA 95035
(408) 946-3700
List Price: $1,095

DriveCard
Mountain Computer Inc.
360 El Pueblo
Scotts Valley, CA 95066
(800) 485-0300
(408) 438-6650
List Price: $995 (10 megabytes), $1,199 (20 megabytes).

Spectrum Graphics Card
Genoa Systems Corp.
73 E. Trimble Rd.
San Jose, CA 95131
(408) 945-9720
List Price: $459